Radiological and Chemical Fact Sheets to Support Health Risk Analyses for Contaminated Areas



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These fact sheets summarize health-related information for contaminants present in the environment as a result of past industrial activities and other releases. The objective is to provide scientific context for risk analyses to guide health protection measures. Geared toward an audience familiar with basic risk concepts, they were originally developed for the U.S. Department of Energy (DOE) Richland and Chicago Operations Offices to serve as an information resource for people involved in environmental programs. The initial set was expanded to address evolving homeland security concerns, and these 51 radiological and chemical fact sheets also serve as a scientific information resource for the public.

Twenty-nine radionuclide-specific fact sheets have been prepared:

- Americium
- Cadmium
- Californium
- Carbon-14
- Cesium
- Chlorine
- Cobalt
- Curium
- Europium
- Iodine
- Iridium
- Krypton
- Neptunium
- Nickel
- Plutonium
- Polonium
- Potassium-40
- Protactinium
- Radium
- Samarium
- Selenium
- Strontium
- Technetium
- Thorium
- Tin
- Tritium
- Uranium
- Depleted uranium (DU)
  complements uranium sheet
- Zirconium

Four companion fact sheets present basic radiological concepts:

- Ionizing radiation
- Natural decay series (radium, thorium, and uranium)
- Transuranic radionuclides and decay series (plutonium and others)
- Radioactive properties, internal distribution, and risk coefficients

Two additional sheets directly address the homeland security context for a subset of radionuclides:

- Radiological dispersal device
- Health-based radionuclide concentrations in drinking water and air

Several of the radiological fact sheets also include information for chemical toxicity, notably those for cadmium, chlorine, nickel, selenium, strontium, and uranium. In addition to the radiological fact sheets, chemical-specific fact sheets have been prepared for 7 nonradioactive metals; 5 organic compounds (including one class of compounds); and 2 inorganic ions (with one covering a pair of anions):

- Arsenic
- Beryllium
- Chromium
- Copper
- Lead *(includes link to radiological information)*
- Mercury
- Zinc
- Carbon tetrachloride
- Chloroform
- Polychlorinated biphenyls (PCBs)
- Trichloroethane
- Trichloroethylene
- Cyanide
- Nitrate/nitrite

For cumulative risk analyses, the evaluation of interactions is framed by two fact sheets for mixtures:

- Mixtures concepts
- Arsenic, cadmium, chromium, and lead

These 51 fact sheets are provided in alphabetical order in this report except DU, which follows the general sheet for uranium, and the two mixtures fact sheets, which are provided at the end. Each contaminant-specific fact sheet presents brief information on:

- Key properties, origin, and use
- General environmental levels
- Distribution in the body
- Primary health effects
- Values for estimating risk

Additional information provided separately includes a summary of radionuclide morbidity and mortality risk coefficients for key isotopes (Table 1), a summary of the radioactive properties of these isotopes (Table 2), and source references for the radiological fact sheets (Table 3). For the chemicals, parallel information (chemical toxicity values, illustration of organs affected, and references) is included within the individual fact sheets.

(Note: These fact sheets have been prepared at different times to support various program needs; the preparation date is identified in the header of each. To open a given fact sheet, click on the link provided within the list on the previous page.)